

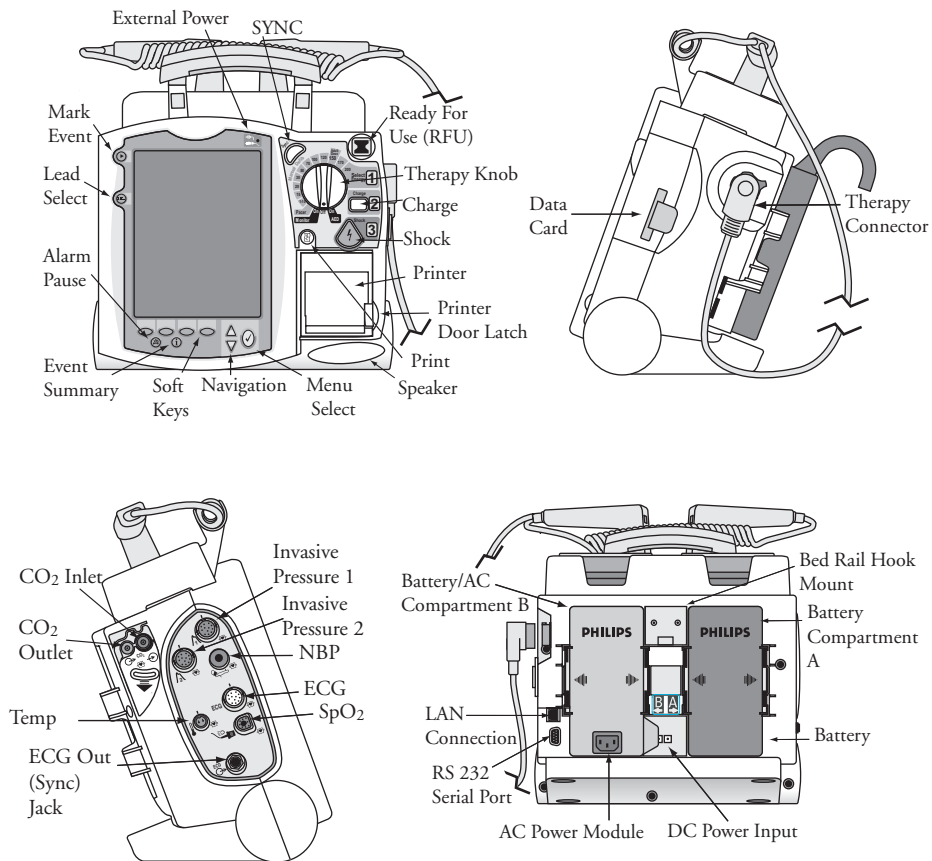
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HEARTSTART MRx
MONITOR/DEFIBRILLATOR

**CONTROLS, CONNECTIONS
AND INDICATORS**

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CONTROLS, CONNECTIONS AND INDICATORS



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September 2006



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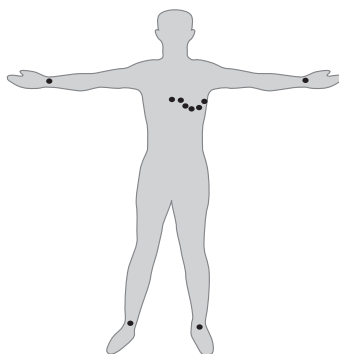
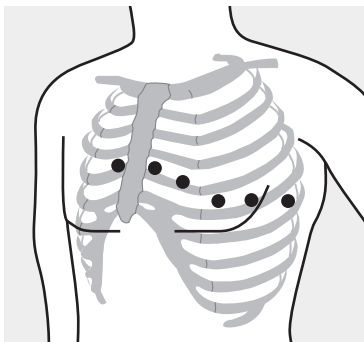
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12-LEAD ECG

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12-LEAD ECG

Electrode Placement for 12-Lead ECG



Acquiring the 12-Lead ECG

1. Turn the Therapy Knob to **Monitor**.
2. Press the **12-Lead** soft key.
3. Check for good signal quality.
4. Press the **Start Acquire** soft key. If prompted, enter patient age and sex.
5. Keep the patient still during the 10-second acquisition period.

Accessing Stored 12-Lead Reports

1. Press the Menu Select  button.
2. Use the Navigation buttons to select **Reports**.
Reports for the current patient are listed by date and time.
3. Use the Navigation buttons to select a report and press the Menu Select button.
4. Select **Print**, **Copy**, or **Delete**, and press the Menu Select button.
5. To select another report, repeat steps 1 through 4.

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ALARMS

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USING ALARMS

Responding to Alarms

1. Check the patient.
2. Identify the alarm(s) indicated.
3. Silence the alarm(s) by pressing the Menu Select  button or one of the Navigation buttons.
4. Address the alarm condition by selecting one of the following options:
 - Alarms Off** - Turn the monitoring parameter's alarms off, displaying  next to the parameter value.
 - Acknowledge** - Recognize that the alarm condition is present, without further action. As the *default* option, **Acknowledge** always appears when an alarm occurs.
 - New Limits** - Adjust parameter alarm limits accordingly.

Note: For *only* Heart Rate/Arrhythmia alarms, your options are either **Acknowledge** or **Acknowledge** and **New Limits**, depending on the alarm.

Checking/Adjusting Alarm Limits

Alarm limits are preset for your device based on its configuration and the patient type. When alarms are on, alarm limits are visible next to the measurement's numeric value.

To adjust an alarm limit setting:

1. Press the Menu Select  button.
2. Select **Measurements/Alarms** and press the Menu Select button.
3. Select the desired measurement from the menu and press the Menu Select button.
4. Select (measurement) **Limits** from the menu and press the Menu Select button.
5. Adjust the limit and press the Menu Select button.

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**MONITORING
CARBON DIOXIDE**

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MONITORING CO₂

Using the Nasal FilterLine

1. Attach the FilterLine tubing to the CO₂ Inlet port.
2. Check that both nostrils are clear.
3. Position the nasal FilterLine on the face by inserting the tips into the nostrils.
4. Pass the FilterLine tubing over the ears, then slide the sleeve up the tubing toward the neck to a comfortable fit under the chin.
5. If using dual purpose FilterLine tubing, connect the green tubing to the oxygen source.
6. Check the positioning of the FilterLine regularly to ensure proper function.

Using the FilterLine and Airway Adapter

1. Attach the FilterLine tubing to the CO₂ Inlet port.
2. Connect the wide end of the airway adapter to the endotracheal tube.
3. Connect the narrow end of the airway adapter to the ventilator tubing or manual resuscitator.

Measuring EtCO₂ and AwRR

The CO₂ waveform is automatically displayed in the configured Wave Sector when the FilterLine is connected to the CO₂ Inlet port. The measurement values for End-Tidal CO₂ (EtCO₂) and Airway Respiration Rate (AwRR) are displayed in Parameter Block 2 as shown below.

SpO2 %	EtCO2 mmHg	AwRR rpm
100 ¹⁰⁰ ₉₀	34 ⁵⁰ ₃₀	18 ³⁰ ₈

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**MONITORING
ECG**

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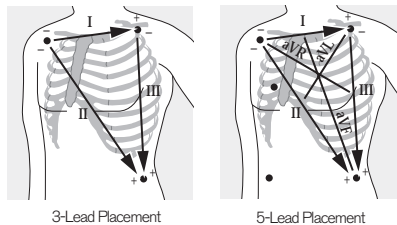
MONITORING ECG

Selecting the Lead for ECG Monitoring

It is important to select a suitable lead for monitoring so that a QRS complex can be accurately detected.

Guidelines:

- QRS tall and narrow
- R-wave above or below baseline (but not bi-phasic)
- T-wave smaller than 1/3 R-wave height
- P-wave smaller than 1/5 R-wave height
- For non-transcutaneously paced patients, the pace pulse should be large enough to be detected with minimal repolarization and not wider than the normal QRS complex.



To select a lead for the primary wave sector:

1. Press the Lead Select  button.
2. Cycle through lead choices.

To select a lead for an additional wave sector:

1. Press the Menu Select  button.
2. Select **Waves** and press the Menu Select button.
3. Select the wave sector and press the Menu Select button.
4. Select the desired lead source and press the Menu Select button.
5. If needed, adjust the ECG wave size (gain) and press the Menu Select button.

Note: Arrhythmia analysis occurs at x1 gain (no matter what the display gain is).

Changing Pacing Status

When monitoring patients with non-transcutaneous pacemakers, it is important to set the paced status correctly. (See MRx Instructions for Use for additional information.)

To change pacing status:

1. Press the Menu Select  button.
2. Select **Patient Info** and press the Menu Select button.
3. Select **Paced** and press the Menu Select button.
4. Select **Yes/No** and press the Menu Select button.

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**MONITORING
INVASIVE PRESSURES**

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MONITORING INVASIVE PRESSURES

Changing a Pressure

1. Press the Menu Select  button.
2. Using the Navigation buttons, select the Measurement/Alarms menu and press the Menu Select button.
3. Select **Press 1** (or **Press 2**) and press the Menu Select button.
4. Select **Label** and press the Menu Select button.
5. Select the appropriate label from the list and press the Menu Select button.
6. Select the size of the scale, the Alarm Source type and high/low Alarm Limits.

Pressure Label Options

ABP - Arterial Blood Pressure	ART - Arterial Blood Pressure
Ao - Aortic Pressure	CVP - Central Venous Pressure
ICP - Intracranial Pressure*	LAP - Left Atrial Pressure
PAP - Pulmonary Artery Pressure	RAP - Right Atrial Pressure
P1 - Non-specific Pressure Label (Channel 1)	P2 - Non-specific Pressure Label (Channel 2)

* Cerebral Perfusion Pressure (CPP) is automatically displayed with ICP when one pressure is already set to ABP, ART or Ao and the other pressure is set to ICP.

Zeroing

1. Place the transducer at the appropriate level for the measurement site.
2. Close the transducer stopcock to the patient and vent the transducer to atmospheric pressure. Then pick one of the following methods:

Using Menu Select button

3. Press the Menu Select button.
4. Using the Navigation button, select **Measurement/Alarms**, press the Menu select button
5. Select the pressure label to zero.
- 6-Highlight **Zero** and press the Menu Select button.

Using a soft key in Monitor Mode

3. Press the button under [**Zero Pressure**] on the display.
4. Using the Navigation buttons, select the pressure(s) to zero from the **Zero** menu and press the Menu Select button.

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**MONITORING
NONINVASIVE BLOOD
PRESSURE**

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MONITORING NBP

Preparing

1. Select the appropriately sized cuff.
2. Attach the cuff to the NBP tubing.
3. Insert the NBP tubing into the NBP port.
4. Apply the blood pressure cuff to the patient's arm or leg.
 - a. Ensure the cuff is completely deflated.
 - b. Wrap the cuff around the limb.
 - c. Check that the edge of the cuff falls within the size range markings.
5. Place the limb at the same level as the patient's heart.

Changing the NBP Schedule

1. Press the Menu Select  button.
 2. Using the Navigation buttons, select the Measurement/Alarms menu and press the Menu Select button.
 3. Select **NBP** and press the Menu Select button.
 4. Select **NBP Schedule** and press the Menu Select button.
 5. Select the desired interval or **Manual**, and press the Menu Select button.
- Interval Options: 1, 2.5, 5, 10, 15, 30, 60 and 120 minutes.
- A Manual NBP measurement may be taken at any time by pressing the **Start NBP** soft key.

Measuring NBP

To measure NBP, press the **Start NBP** soft key. Cuff pressure is displayed as the cuff inflates and deflates. When the measurement completes, the NBP values are displayed.

HR	NBP mmHg Manual	
82	120	SYS 10:40
	60	160
	(100)	90

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**OPERATIONAL
CHECK**

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OPERATIONAL CHECK

Running the Operational Check

1. Insert a charged battery into the HeartStart MRx.
2. Turn the Therapy Knob to 150J.
3. Press the Menu Select button.
4. Using the Navigation buttons, select **Other** and press the Menu Select button.
5. Select **Operational Check** and press the Menu Select button.
6. Select **Run Op Check** and press the Menu Select button.
7. Press the Menu Select button to acknowledge the message **Leaving Normal Operating Mode.**
8. Carefully read and respond to the prompts.

At the completion of the Operational Check, a report is printed that lists the test results and prompts you to visually inspect the device and cables, and to inventory all accessories and supplies.

Note: For device versions greater than or equal to B.05 with Pacing, run Op Check with a pads cable and test external paddles using the Weekly Shock Test.

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NONINVASIVE PACING
(TRANSCUTANEOUS PACING)

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NONINVASIVE PACING (TRANSCUTANEOUS PACING)

Demand Mode Pacing *(Requires ECG leads and pads)*

1. Turn the Therapy Knob to **Pacer**.
2. Press the Lead Select  button to select the desired lead.
3. Verify white R-wave markers appear above or on the ECG waveform.
4. Press the **Pacer Rate** soft key, select the desired number of paced pulses per minute, and press the Menu Select  button.
5. If needed, press the **Pacer Output** soft key, use the Navigation buttons to adjust the initial pacer output, and press the Menu Select button.
6. Press the **Start Pacing** soft key.
7. Verify white pacing markers appear in front of every QRS.
8. If cardiac capture is not obtained, press the **Pacer Output** soft key, increase the output until capture occurs, decrease the output to the lowest level that still maintains capture, and press the Menu Select button.
9. Verify the presence of a peripheral pulse.



Demand Mode
Capture

Fixed Mode Pacing *(Can be done with pads only)*

1. Turn the Therapy Knob to **Pacer**.
2. Set the pacer mode to Fixed.
 - Select **Pacer Mode** from the Main Menu.
 - Select **Fixed** and press the Menu Select  button.
3. If using leads, press the Lead Select  button to select the desired lead.
4. Press the **Pacer Rate** soft key, select the desired number of paced pulses per minute, and press the Menu Select button.
5. If needed, press the **Pacer Output** soft key, use the Navigation buttons to adjust the initial pacer output, and press the Menu Select button.
6. Press the **Start Pacing** soft key.
7. Verify cardiac capture. If it is not obtained, press the **Pacer Output** soft key, increase the output until capture occurs, decrease the output to the lowest level that still maintains capture, and press the Menu Select button.
8. Verify the presence of a peripheral pulse.

NOTE: If monitoring SpO₂ when pacing, activate the Pulse alarms to assess for peripheral perfusion through the SpO₂ transducer.

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Q-CPR™

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Q-CPR™



Prior to Use

1. Verify the Pads/CPR cable is connected to the MRx Therapy port.
2. Verify the Compression Sensor is connected to the Pads/CPR cable.
3. Verify a new Compression Sensor Adhesive Pad is applied to the Compression Sensor.

Preparing for Q-CPR

1. Connect the multifunction electrode pads to the Pads/CPR cable.
2. Apply the multifunction pads to the patient in the **anterior/anterior** position.
3. Position the Compression Sensor on the patient as shown on the green liner (i.e., on the lower half of the sternum).

Q-CPR in Manual Defib Mode

- Q-CPR starts automatically when you turn the Therapy Knob to 150J
or perform a chest compression with the Compression Sensor.
- To manually activate Q-CPR, press the **Start CPR** soft key.

Q-CPR in AED Mode

- Q-CPR starts automatically when you perform a chest compression with the Compression Sensor during the CPR Pause period. If necessary, press the **Pause for CPR** soft key to activate the Pause period.
- AED Mode provides only corrective text and voice prompt feedback.

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READY FOR USE INDICATOR

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READY FOR USE INDICATOR

The Ready For Use (RFU) indicator is located on the upper, right corner of the device. It indicates the status of the therapy delivery functions of the monitor/defibrillator using the following definitions:

A blinking black hourglass symbol  indicates the shock, pacing, and ECG functions of the device are ready for use. Sufficient battery power is available for device operation.

A blinking red "X"  and a periodic audio chirp indicate no battery is present or a low battery condition. If a battery is inserted and charging, the audio chirp is not present.

A solid red "X"  and a periodic audio chirp indicate a failure has been detected that may prevent the delivery of a shock, pacing, or ECG acquisition. An error message will display at power-on.

A solid red "X"  without periodic audio chirps indicates either there is no power available, or a device failure has occurred. If, after power is supplied, the indicator reverts to the blinking black hourglass symbol, the device is once again ready for use.

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MONITORING
SpO₂

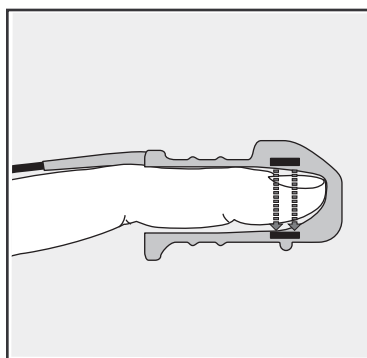
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MONITORING SpO₂

Applying the Sensor

Follow the manufacturer's directions for applying and using the sensor, making sure to observe any warnings and cautions. For best results:

- Make sure the sensor is dry.
- If the patient is moving, secure the sensor cable loosely to the patient.
- Make sure the transducer is not too tight.
- Keep power cables away from the sensor cable and connections.
- Avoid placing the sensor in an environment with bright lights. If necessary, cover the sensor with opaque material.
- Avoid placing the sensor on an extremity with poor perfusion.



Monitoring SpO₂

1. Connect the appropriate sensor cable to the HeartStart MRx.
2. Apply the sensor to the patient.
3. If the HeartStart MRx is not turned on, turn the Therapy Knob to **Monitor**.

The pleth wave appears after a few seconds, followed by the oxygen saturation value. As the patient's oxygen saturation changes, the SpO₂ value is continuously updated and the associated waveform is displayed. See the Alarms Quick Card for information on adjusting alarms.

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**MONITORING
TEMPERATURE**

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MONITORING TEMPERATURE

To Monitor a Temperature

1. Connect the temperature cable to the HeartStart MRx.
2. Select the correct temperature label for your measurement.
3. Check that the current device settings (including alarm settings) are appropriate for the patient.
4. Apply the temperature probe to the patient.

Selecting a Temperature Label

1. Press the Menu Select  button.
2. Using the Navigation buttons, select the Measurement/Alarms menu and press the Menu Select button.
3. Select the temperature label option currently assigned to your measurement (default is Temp) and press the Menu Select button.
4. Select **Label** and press the Menu Select button.
5. Select the appropriate label from the list provided and press the Menu Select button.

Temperature Label Options

Tesoph - esophageal temperature
Trect - rectal temperature
Tskin - skin temperature
Temp - non-specific temperature label
Tcore - core temperature
Tnaso - nasopharyngeal temperature
Tvesic - urinary bladder
Tart - arterial temperature
Tven - venous temperature

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**VITAL SIGNS
TRENDING**

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VITAL SIGNS TRENDING

Viewing Trending Data

1. Place the HeartStart MRx into Monitor Mode.
2. Press the Menu Select  button.
3. Using the Navigation buttons, select Trends and press the Menu Select button. The Vital Signs Trending Report appears in the bottom two wave sectors.

Scrolling

LEFT/RIGHT: Use the << or >> soft keys to scroll left and right (backward/forward) in the report screen. The soft key will be inactive if there is no more data to be viewed in that direction.

UP/DOWN: If there are more vital signs than can be shown on the screen, use the Navigation buttons next to the Menu Select button to scroll up and down with the vertical scroll bar on the display. (Make sure there are no menu items active at the time.)

Reading Trending Data

- When trending is initially displayed, the latest (most recent) trending data will appear in the far right column; older data flows to the left.
- The display will auto-update as new data becomes available as long as the latest data is displayed on the screen.
- A **-?-** indicates that the parameter has invalid information.
- A **?** just before a numeric value indicates questionable data.
- An empty space indicates unavailable data.

Printing the Vital Signs Trending Report

You can print the Vital Signs Trending Report two ways:

1. Press the soft key under the **Print Trends** label. A report for the displayed period and interval is printed.
2. Press the Summary button and select Trends and then Trends Interval. A report for the entire incident period is printed.

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WEEKLY SHOCK TEST

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WEEKLY SHOCK TEST

How to perform the Weekly Shock Test

Test each type of patient therapy cable used (multifunction electrode pads or paddles).

If you are using paddles, make sure the paddles are secure in their pockets and that the Patient Contact Indicator (PCI) LEDs located on the sternum paddles are not lit. If the LEDs light, adjust the paddles in their pockets.

If the LEDs continue to light, clean both adult and pediatric paddle electrode surfaces.

If you are using multifunction electrode pads, attach a test load to the end of the patient Therapy Cable.

1. Turn the Therapy Knob to 150J
2. Press the Charge Button.

NOTE: If it becomes necessary to disarm the defibrillator, press **[DISARM]**

3. If using:

- Pads, press the Shock button on the HeartStart MRx to deliver a shock into the test load.
- External paddles, simultaneously press the shock buttons located on the paddles to deliver a shock into the test load.

4. The strip prints immediately if configured to do so. If the strip does not print immediately, press the Print button.

5. Confirm on the printed strip that the energy delivered to the test load is 150J +/- 23J (127J to 173J). If not, take the device out of use and call for service.

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